basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 10

PHYSICAL SCIENCES: CHEMISTRY (P2)
FISIESE WETENSKAPPE: CHEMIE (V2)

NOVEMBER 2019

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 10 pages.
Hierdie nasienriglyne bestaan uit 10 bladsye.

Approved Examiner 19/11/19

Approved Int. Mod. 19/11/2019

QUESTION 1/*VRAAG 1*

1.1 A ✓✓ (2)

1.2 C ✓✓ (2)

1.3 B ✓✓ (2)

1.4 D ✓✓ (2)

1.5 C ✓✓ (2)

1.6 C ✓✓ (2)

1.7 B ✓✓ (2)

1.8 D ✓✓ (2)

1.9 C ✓✓ (2)

1.10 C ✓✓ (2)
[20]

QUESTION 2/*VRAAG 2*

2.1

2.1.1 Positive ions/cations/*positiewe ione /katione* ✓
Delocalised valence electrons/*gedelokaliseerde valenselektrone* ✓ (2)

2.1.2 Metallic bond/*metaalbinding* ✓ (1)

2.2 Left/*Links* ✓ (1)

2.3 Hg ✓ (1)

2.4

2.4.1 Homogeneous/*Homogeen* ✓
Uniform composition/Separate particles cannot be distinguished. /All components are in the same phase. ✓
Uniforme samestelling/Afsonderlike deeltjies kan nie onderskei word nie./Alle komponente is in dieselfde fase. (2)

2.4.2 Fe_2O_3 ✓ (1)

2.5

2.5.1 A ✓
Lowest density/*Laagste digtheid* ✓ (2)

2.5.2 Electrical conductivity is the conduction of electric current/charge ✓and thermal conductivity is the conduction of heat. ✓
Elektriese geleiding is die geleiding van elektriese stroom/ladings en termiese geleiding is die geleiding van hitte. (2)

2.5.3 B ✓
B has a high density. /B is a good conductor of electricity. /B is a good conductor of heat. ✓
B het 'n hoë digtheid./B is 'n goeie geleier van elektrisiteit./B is 'n goeie geleier van hitte. (2)
[14]

QUESTION 3/*VRAAG 3*

3.1.1

Marking guidelines/*Nasienriglyne*
If any of the underlined key words/phrases in correct context are omitted:
minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases in korrekte konteks uitgelaat is: minus 1 punt

Atoms of the same element having the same number of protons, but different number of neutrons. ✓✓
Atome van dieselfde element wat dieselfde getal protone het, maar verskillende getalle neutrone.
OR/*OF*
Same atomic number, but different mass numbers.
Dieselfde atoomgetalle, maar verskillende massagetalle. (2)

3.1.2 Average/gemiddelde $A_R = \frac{(80)(24)+(10)(25)+(10)(26)}{100}$ ✓ ✓ ✓
$= 24{,}3$ ✓ (4)

3.1.3 (a) 12 ✓ (1)

(b) 12 ✓ (1)

(c) 12 ✓ (1)

(d) 10 ✓ (1)

(e) 24 ✓ (1)

3.2.1 7 ✓ (1)

3.2.2 3 ✓ (1)

3.2.3 3 ✓ (1)

3.2.4 Cℓ ✓ (1)

3.2.5 Ionic bond/*Ioniese binding* ✓ (1)

3.2.6 Mg^{2+}:

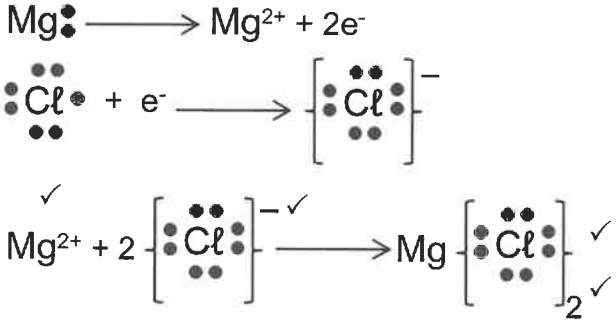
2p	↓↑	↓↑	↓↑
2s	↓↑		
1s	↓↑		

✓ ✓

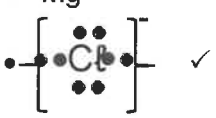
Marking criteria/*Nasienriglyne*
- 2 electrons in 1s and 2s orbitals each ✓
  2 elektrone in elk van 1s– en 2s-orbitale
- 6 electrons in 2p orbitals /*6 elektrone in 2p-orbitale* ✓

IF/INDIEN:
Any extra electrons/*Enige ekstra elektrone: minus 1* (2)

3.2.7



✓ ✓ ✓ ✓ ✓

Marking Criteria / *Nasienriglyne*
- Mg^{2+} ✓
-  ✓
- Ratio/*verhouding* 1 Mg : 2 Cℓ ✓
- Final(e) answer/*antwoord:* $MgCℓ_2$ ✓

(4)
[22]

QUESTION 4/*VRAAG 4*

4.1

4.1.1 J ✓ (accept/*aanvaar* F) (1)

4.1.2 E ✓(accept/*aanvaar* Be) (1)

4.1.3 A ✓ (accept/*aanvaar* K) (1)

4.1.4 J ✓ (accept/*aanvaar* F) (1)

4.1.5 H ✓ (accept/*aanvaar* Ge) (1)

4.1.6 L ✓ (accept/*aanvaar* He) (1)

4.1.7 **Any ONE/*Enige EEN***
- G ✓ (accept/*aanvaar* O)
- J (accept/*aanvaar* F) (1)

4.1.8 D ✓ (accept/*aanvaar* Aℓ) (1)

4.2

4.2.1

Marking guidelines/*Nasienriglyne*
If any of the underlined key words/phrases in correct context are omitted: minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases in korrekte konteks uitgelaat is: minus 1 punt

First ionisation energy is the energy needed (per mole) ✓to remove the first electron from an atom (in the gaseous phase). ✓
Eerste ionisasie energie is die energie benodig (per mol) om die eerste elektron te verwyder vanaf 'n atoom (in die gasfase). (2)

4.2.2 $A(g) + 400\ kJ{\cdot}mol^{-1} \rightarrow A^+(g)$ ✓+ e^- ✓

ACCEPT/*AANVAAR*
$K(g) + 400\ kJ{\cdot}mol^{-1} \rightarrow K^+(g)$ ✓+ e^- ✓ (2)

4.3 Electron affinity/*Elektronaffiniteit* ✓ (1)

4.4

4.4.1 D_2G_3 ✓✓ (accept/*aanvaar* $A\ell_2O_3$) (2)

4.4.2 AJ ✓✓ (accept/*aanvaar* KF) (2)
[17]

QUESTION 5/*VRAAG 5*

5.1 Aluminium sulphate/*Aluminiumsulfaat* ✓ (1)

5.2 The mass of one mole of a substance (measured in $g \cdot mol^{-1}$). ✓✓ **(2 or 0)**
Die massa van een mol van 'n stof (gemeet in $g \cdot mol^{-1}$). ***(2 of 0)*** (2)

5.3

5.3.1 $M(Al_2(SO_4)_3) = 2(27) + 3(32) + 12(16)$
$= 342\ g \cdot mol^{-1}$ ✓✓ (2)

Note/Let wel:
If unit omitted/*Indien eenheid uitgelaat is:* Max./*Maks.* $\frac{1}{2}$

5.3.2 **POSITIVE MARKING FROM QUESTION 5.3.1.**
POSITIEWE NASIEN VANAF VRAAG 5.3.1.

$$\%Al = \frac{2(27)}{342} \times 100$$
$$= 15,79\% \ ✓$$
$$\%S = \frac{3(32)}{342} \times 100$$
$$= 28,07\% \ ✓$$
$$\%O = \frac{12(16)}{342} \times 100$$
$$= 56,14\% \ ✓$$

(3)

5.3.3 **POSITIVE MARKING FROM QUESTION 5.3.1.**
POSITIEWE NASIEN VANAF VRAAG 5.3.1.

$$n(Al_2(SO_4)_3) = \frac{m}{M} \ ✓$$
$$= \frac{85,5}{342} \ ✓$$
$$= 0,25 \text{ mol} \ ✓$$

(3)

5.3.4 **POSITIVE MARKING FROM QUESTION 5.3.3.**
POSITIEWE NASIEN VANAF VRAAG 5.3.3.
Number of Al atoms = $\underline{n \times N_A} \times$ number of atoms
$= (0,25)(6,02 \times 10^{23})$ ✓(2) ✓
$= 3,01 \times 10^{23}$ atoms ✓ (3)

5.4

5.4.1 Ionic structure/*Ioniese struktuur* ✓ (1)

5.4.2 $A\ell^{3+}$ / aluminium ions / positive ions / cations / *aluminiumione/positiewe ione/ katione* ✓
SO_4^{2-} / sulphate ions / negative ions / anions /*sulfaatione / negatiewe ione / anione* ✓
IF/*INDIEN*
Ions/*Ione* Max./*Maks.* $\frac{1}{2}$ (2)

5.4.3 **ANY TWO/*ENIGE TWEE*:**
- Brittle/*bros* ✓
- Hard ✓
- Non-conductor of electricity/ *Nie-geleier van elektrisiteit*
- Non-conductor of heat/ *Nie-geleier van hitte*
- High melting point/ *Hoë smeltpunt* (2)

5.5
5.5.1 The amount/number of moles (of solute) per cubic decimetre/litre (of solution).
(2 or 0)
Die hoeveelheid/aantal mol (opgeloste stof) per kubieke desimeter/liter (van die oplossing). ***(2 of 0)*** (2)

5.5.2

POSITIVE MARKING FROM QUESTION 5.3.1. *POSITIEWE NASIEN VANAF VRAAG 5.3.1.*	
OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$n = \frac{m}{M}$ $= \frac{500}{342}$ ✓ $= 1,46$ mol $c = \frac{n}{V}$ ✓ $= \frac{1,46}{2}$ ✓ $= 0,73$ mol·dm^{-3} ✓	$c = \frac{m}{MV}$ ✓ $= \frac{500}{✓(342)(2)✓}$ $= 0,73$ mol·dm^{-3} ✓
Marking criteria/*Nasienriglyne*	
• Appropriate formula for concentration ✓ *Toepaslike formule vir konsentrasie* • Dividing/ *Deel* 500 g by/*deur* 342 g·mol^{-1} ✓ • Dividing by / *Deel deur* 2 dm^3 ✓ • Final(e) answer/*antwoord*: 0,73 mol·dm^{-3} ✓	

(4)
[25]

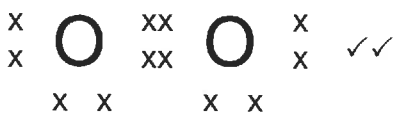
QUESTION 6/*VRAAG 6*

6.1
6.1.1 Exothermic ✓
Energy is released. ✓

Eksotermies.
Energie word vrygestel. (2)

6.1.2 **Marking guidelines/*Nasienriglyne***
If any of the underlined key words/phrases in correct context are omitted:
minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases in korrekte konteks uitgelaat is: minus 1 punt

A group of two or more atoms that are covalently bonded (and that functions as a unit). ✓✓
'n Groep van twee of meer atome wat kovalent gebind is (en as 'n eenheid funksioneer). (2)

6.1.3  ✓✓ (2)

6.1.4
$$n(ZnS) = \frac{m}{M} \checkmark$$
$$= \frac{7}{97} \checkmark$$
$$= 0{,}072 \text{ mol} \checkmark$$
(3)

6.1.5 **Marking guidelines/Nasienriglyne**
- Use ratio/*Gebruik verhouding*: $n(O_2) = 1½n(ZnS)$ ✓
- Substitute/*Vervang* 32 g·mol^{-1}
- Final answer/*Finale antwoord*: 3,46 g ✓

POSITIVE MARKING FROM QUESTION 6.1.4.
POSITIEWE NASIEN VANAF VRAAG 6.1.4.

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$n(O_2) = \frac{3}{2} n(ZnS)$ $= \frac{3}{2}(0{,}072)$ ✓ $= 0{,}108$ mol $n(O_2) = \frac{m}{M}$ $0{,}108 = \frac{m}{32}$ ✓ $\therefore m = 3{,}46$ g ✓	2 mol ZnS + 3 mol O_2 ✓ 2(97)g + 3(32) g ✓ 7 g + 3,46 g O_2 ✓

(3)

6.1.6 **POSITIVE MARKING FROM QUESTION 6.1.4.**
POSITIEWE NASIEN VANAF VRAAG 6.1.4.

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$n(SO_2) = n(ZnS)$ $= 0{,}072$ mol $n = \frac{V}{V_M}$ ✓ $0{,}072$ ✓$= \frac{V}{22{,}4}$ ✓ $V = 1{,}62$ dm^3 ✓ Range/*Gebied* (1,568 – 1,62 g)	2 mol ZnS → 2 mol SO_2 ✓ 2(97)g ✓→ 2(22,4) dm^3 ✓ 7 g → 1,62 dm^3 ✓

(4)

6.2

6.2.1 Sulphuric acid/ *swawelsuur* ✓
ACCEPT/AANVAAR:
Hydrogen sulphate/*Waterstofsulfaat* ✓ (1)

6.2.2 $ZnSO_4$ ✓✓ (2)

6.2.3 Redox (reaction)/*Redoks(reaksie)* ✓
- The charge (of Zn/H) changes. / Transfer of electrons. / Change in oxidation number. ✓
  Die lading (van Zn/H) verander. / Oordrag van elektrone. / Verandering in oksidasie getal.
- (Zn) 0 to/*na* +2 ✓ in $ZnSO_4$. / (H) +1 (in H_2SO_4) to/*na* 0 (in H_2). (3)

6.2.4 When a burning wood splinter ✓ is brought close to the gas it makes a popping sound. ✓
'n Brandende houtsplinter wat naby die gas gebring word, maak 'n plofgeluid. (2)
[24]

QUESTION 7/*VRAAG 7*

7.1.1

Marking guidelines/*Nasienriglyne*
If any of the underlined key words/phrases in correct context are omitted:
minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases in korrekte konteks uitgelaat is: minus 1 punt

An electrolyte is a solution that conducts electricity ✓ through the movement of ions.✓
'n Elektroliet is 'n oplossing wat elektrisiteit gelei deur die beweging van ione. (2)

7.1.2 Polar/*Polêr* ✓
It has (two) oppositely charged poles/*Dit het (twee) teenoorgesteld gelaaide pole.* ✓ (2)

7.1.3

a) Concentration of ions/*Konsentrasie van ione* ✓ (1)

b) Conductivity/*Geleidingsvermoë* ✓ (1)

7.1.4 $NaCl(s)$ ✓ $\xrightarrow{H_2O(l)}$ $Na^+(aq) + Cl^-(aq)$ ✓ Bal. ✓

NOTE/*LET WEL*:
Ignore phases./*Ignoreer fases.* (3)

7.1.5 $CaCl_2$ ✓
A higher concentration of ions forms in solution.✓
'n Hoër konsentrasie van ione vorm in oplossing.
ACCEPT/*AANVAAR*
For the same number of drops the conductivity is higher.
Vir dieselfde aantal druppels is die geleidingsvermoë hoër. (2)

7.2.1 K_2CO_3 ✓✓ (2)

7.2.2 $BaSO_4$ ✓✓ (2)

7.2.3 $BaCO_3(s) + 2HNO_3(aq)$ ✓→ $Ba(NO_3)_2(aq) + CO_2(g) + H_2O(\ell)$ ✓ Bal. ✓

NOTE/*LET WEL*:
Ignore phases./*Ignoreer fases.* (3)
[18]

QUESTION 8/*VRAAG 8*

8.1
8.1.1

Marking guidelines/*Nasienriglyne*
If any of the underlined key words/phrases in correct context are omitted: minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases in korrekte konteks uitgelaat is: minus 1 punt

Condensation is the process during which a gas or vapour changes to a liquid. ✓✓
Kondensasie is die proses waardeur 'n gas of damp in 'n vloeistof verander. (2)

8.1.2

Marking guidelines/*Nasienriglyne*
If any of the underlined key words/phrases are omitted: minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases uitgelaat is: minus 1 punt

Evaporation is the change of a liquid into a vapour at any temperature (below the boiling point). ✓✓
Verdamping is die verandering van 'n vloeistof in 'n damp by enige temperatuur (onder die kookpunt). (2)

8.2

8.2.1 Evaporation/*Verdamping* ✓ (1)

8.2.2 Condensation/*Kondensasie* ✓ (1)

8.2.3 Precipitation/*Presipitasie* ✓ (1)

8.2.4 Infiltration/Percolation/*Infiltrasie/insypeling/Perkolasie* ✓ (1)

8.3 The hydrosphere is the water of the Earth.✓ It is found as liquid water, ice and water vapour (in the atmosphere). ✓
Die hidrosfeer is die water van die Aarde en dit word gevind as vloeibare water, ys en waterdamp (in die atmosfeer). (2)
[10]

TOTAL/*TOTAAL*: 150